

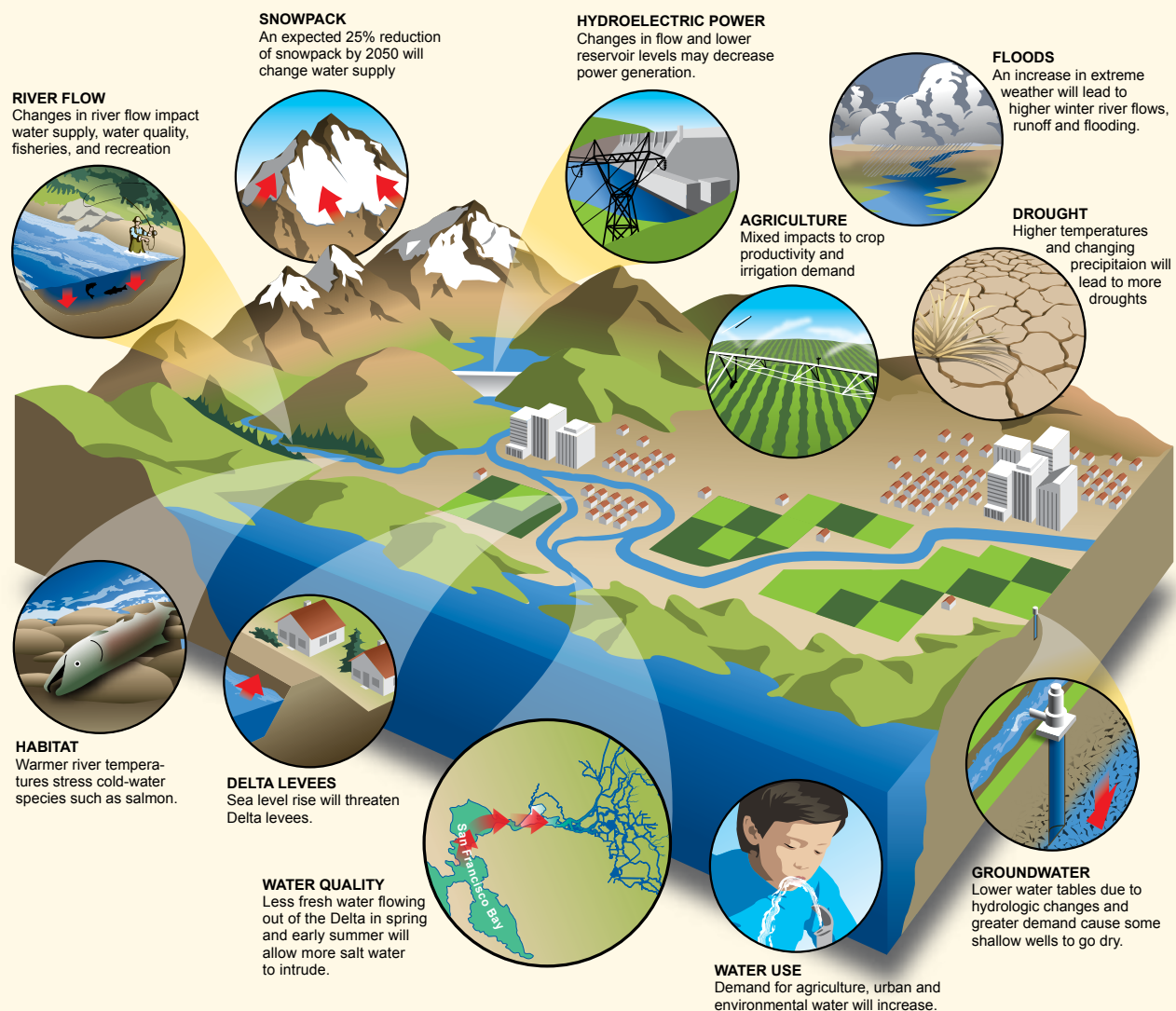
# Climate Change in California

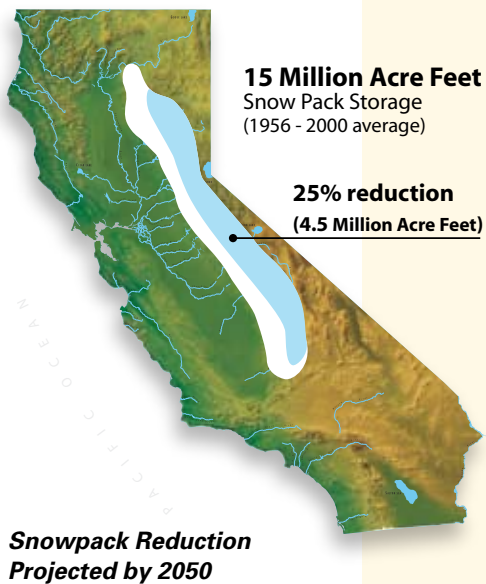
June 2007



Department of Water Resources

Climate change is already impacting California's water resources. In the future, warmer temperatures, different patterns of precipitation and runoff, and rising sea levels will profoundly affect the ability to manage water supplies and other natural resources. Adapting California's water management systems to climate change presents one of the most significant challenges for the 21st century.





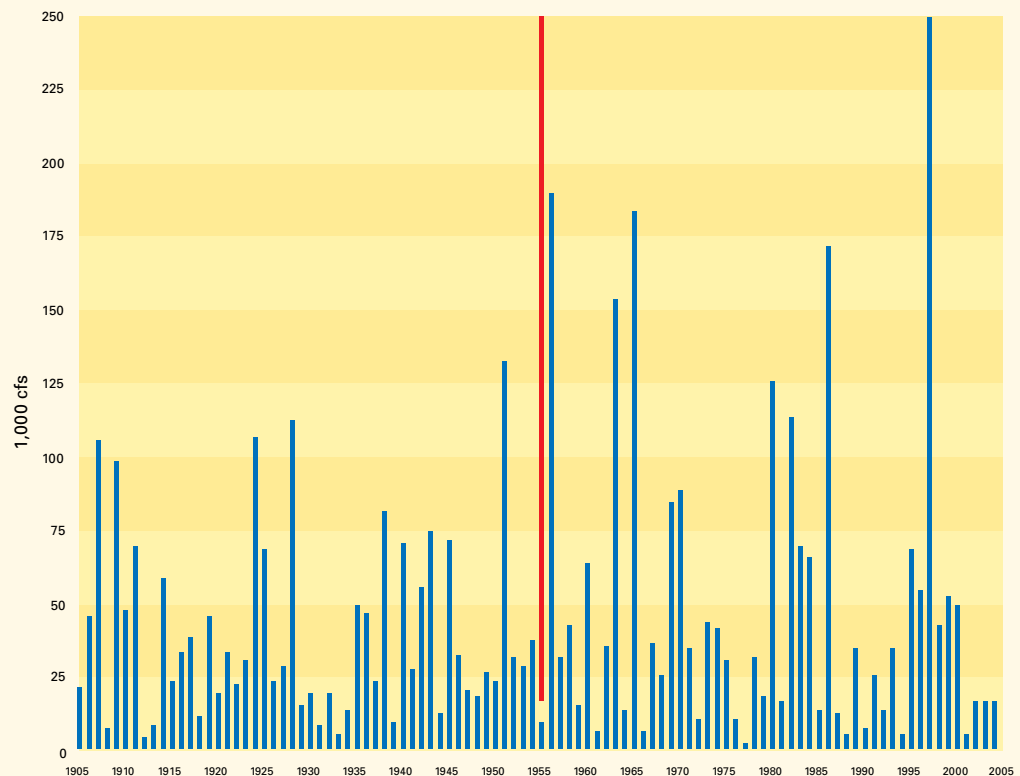
## Climate Change Impacts to California's Water Resources

Historical evidence and scientific studies have already uncovered disturbing trends due to climate change.

- By 2050, scientists project a loss of at least 25 percent of the Sierra snowpack, an important source of urban, agricultural and environmental water.
- Weather patterns are becoming more variable, causing more severe winter and spring flooding and longer, drier droughts.
- Since the 1950's, flood flows on many California rivers have been the largest on record. Levees, dams, and flood bypasses are forced to manage flows for which they weren't designed.
- In the past century, sea level has risen over one-half foot at the Golden Gate. Projected, continued sea level rise will threaten many coastal communities as well as the sustainability of the Sacramento-San Joaquin Delta which supplies 25 million Californians with drinking water.
- Rising water temperatures and changes in runoff patterns may adversely impact salmon and other aquatic species.

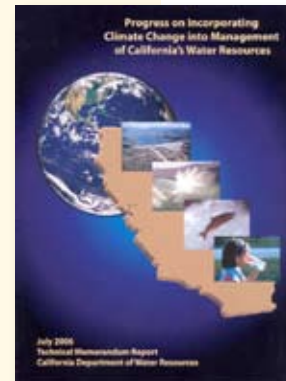
### American River Peak Flows

The frequency and intensity of peak river flows can be an indicator of climate-related changes. The red line indicates the year that Folsom Dam was built. Six of the highest flow levels on the American River have occurred since then.



## Integrated Regional Water Management

Integrated regional water management (IRWM) plans are the primary strategy to achieve reliable, high quality water supplies and protect and enhance the environment. IRWM fosters cooperation among communities and benefits stakeholders by resolving conflicts, leveraging existing infrastructure, and building a diversified portfolio of water supply alternatives. This approach will help regions find the best solutions to the effects of climate change in their local areas.

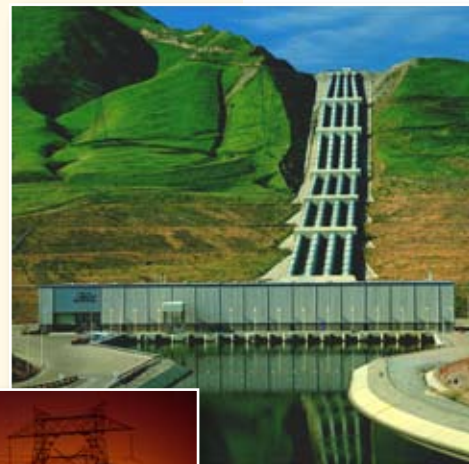


## Groundwater and Surface Storage

Climate change may cause more frequent and more severe winter storms, and longer, drier periods of drought. New groundwater and surface water storage will ensure a reliable water supply for California's future, and provide vital flood protection by managing more variable precipitation and runoff. In January 2007, Governor Schwarzenegger proposed \$4.5 billion for the development of additional surface and ground storage to increase the flexibility of California's water management systems.

## Water and Energy

Climate change may reduce hydropower generation production. At the same time, energy use may increase because of higher temperatures and greater water demand. These conditions may force greater reliance on fossil fuels that produce greenhouse gases. Future water management activities must consider strategies to conserve energy and reduce greenhouse gas emissions.



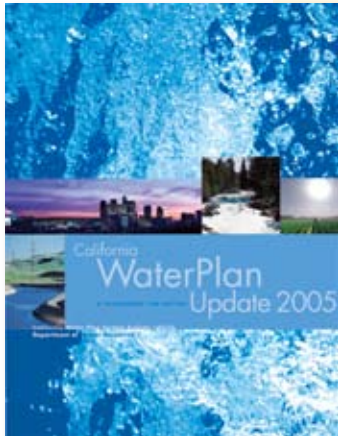
## The Delta

Rising sea levels will increase pressure on Delta levees, and force more salt water from the San Francisco Bay into the Delta. As currently managed, more fresh water will be needed to repel seawater and maintain water quality standards, especially during drier years. Compounding these impacts from sea level rise, shifting precipitation and runoff patterns will direct more water to the Delta during winter and spring, but less during the dry summer months.



*The Sacramento-San Joaquin Delta*

*Ira J. Chrisman  
Wind Gap Pumping  
Plant (top) and  
transmission  
lines (bottom).*



*DWR's Bulletin 160  
Executive Summary,  
released in 2005*

## California Responds to Climate Change

The state's *Water Plan Update 2005* extensively considers climate change impacts to California's water management systems, and presents two dozen resource management strategies to cope with the state's uncertain water future. These actions include reducing water demand, increasing water supply, improving water quality, practicing resource stewardship and improving operational efficiency and transfers.

*Update 2005* recommends that state government work with researchers to monitor, predict and prepare for the effects of global climate change on water systems and the environment. In fact, Californians are already taking action.

- Governor Schwarzenegger signed Executive Order S-3-05 in June 2005, recognizing global climate change and its impacts on California, and creating the Governor's Climate Action Team. In September 2006, the Governor signed Assembly Bill 32 (Nunez and Pavley) into law, mandating the reduction of greenhouse gas emissions in California.
- In July 2006, DWR released *Progress on Incorporating Climate Change into Management of California's Water Resources*, a major technical report on how climate change could affect future water resources.
- In November 2006, voters passed Propositions 1E and 84 to provide \$4.9 billion in new flood management investments (which will help prepare for more frequent and intense floods and sea level rise), and nearly \$1 billion in integrated regional water management, and climate change evaluation and adaptation.

### **Strategies to address impacts of climate change:**

- *Increase monitoring of climatologic and water resource conditions*
- *Improve flood-forecasting ability and climate change models to assess future flood protection needs*
- *Refine projections of climate change consequences on water supply and reliability*
- *Conduct system re-operation studies to improve reliability and maintain sufficient flood reservation*
- *Assess climate change effects on hydropower production*
- *Reduce greenhouse gas emissions from water management activities*
- *Study the combined effects of increased atmospheric carbon dioxide and increased temperature on crop water needs (to predict future water demand)*
- *Analyze the effect of sea level rise on Delta salinity and levees*
- *Adapt statewide water management systems by incorporating more flexibility*
- *Improve interaction and coordination with other state, federal, and academic researchers*